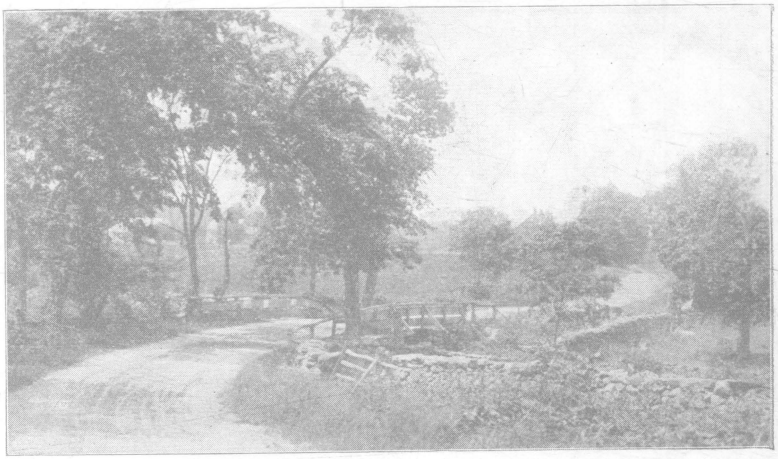
The Agricultural College

EXTENSION BULLETIN

VOLUME II JUNE, 1907 NUMBER 10

MOSQUITOES

By HERBERT OSBORN, Professor of Zoology



"And then in the dust of the road again;
And the teams we met, and the countrymen;
And the long highway, with sunshine spread
As thick as butter on country bread,
Our cares behind and our hearts ahead.
Out to Old Aunt Mary's."

—*Riley.*

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COLUMBUS

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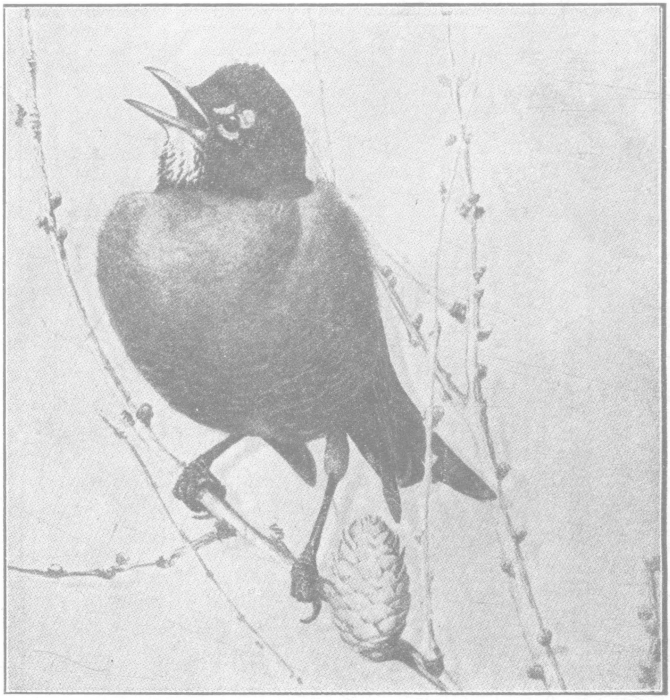


THE ROBIN

This is the carol the robin throws
Over the edge of the valley;
Listen how boldly it flows,
Sally on sally:

Tirra-lirra, down the river,
Laughing water all a-quiver.
Day is near, clear, clear.
Fish are breaking,
Time for waking.
Tup, Tup, Tup.
Do you hear? All clear.
Wake up.

—*Selected.*

REMORSE

I killed a robin. The little thing,
With scarlet breast on a glossy wing,
That comes in the apple tree to sing

I flung a stone as he twittered there,
I only meant to give him a scare,
But off it went—and hit him square

A little flutter—a little cry—
Then on the ground I saw him lie,
I didn't think he was going to die.

But as I watched him I soon could see
He never would sing for you or me
Any more in the apple tree.

Never more in the morning light
Never more in the sunshine bright
Trilling his song in gay delight.

And I'm thinking every summer day,
How never, never I can repay
The little life that I took away

—*Sydney Dayre, in Youth's Companion.*

MOSQUITO PARADISE

TO A MOSQUITO

Fair insect! that, with threadlike legs spread out,
And blood-extracting bill and filmy wing,
Dost murmur, as thou slowly sail'st about.
In pitiless ears full many a plaintive thing,
And tell how little our large veins should bleed,
Would we but yield them to thy bitter need

Unwillingly, I own, and, what is worse,
Full angrily men hearken to thy plaint;
Thou gettest many a brush, and many a curse.
For saying thou art gaunt, and starved, and faint;
Even the old beggar, while he asks for food,
Would kill thee, hapless stranger, if he could.

I call thee stranger, for the town, I ween,
Has not the honor of so proud a birth—
Thou com'st from Jersey meadows, fresh and green,
The offspring of the gods, though born on earth;
For Titan was thy sire, and fair was she,
The ocean nymph, that nursed thy infancy.

Beneath the rushes was thy cradle swung,
And when, at length, thy gauzy wings grew strong,
Abroad to gentle airs their folds were flung,
Rose in the sky and bore thee soft along
The south wind breathed to waft thee on thy way,
And danced and shone beneath the billowy bay.

Calm rose afar the city spires, and thence
Came the deep murmur of its throng of men,
And as its grateful odors met thy sense,
They seemed the perfumes of thy native fen
Fair lay its crowded streets, and at the sight
Thy tiny song grew shriller with delight.

At length thy pinions fluttered in Broadway—
Ah! there were fairy steps, and white necks kissed
By wanton airs, and eyes whose killing ray
Shone through the snowy veils like stars through mist;
And fresh as morn, on many a cheek and chin,
Bloomed the bright blood through the transparent skin.

Sure these were sights to touch an anchorite!
What! do I hear thy slender voice complain?
Thou wailest, when I talk of beauty's light,
As if it brought the memory of pain,
Thou art a wayward being—well—come near,
And pour thy tale of sorrow in my ear.

* * * * * * * * *

Thou'rt welcome to the town; but why come here
To bleed a brother poet, gaunt like thee?
Alas! the little blood I have is dear,
And thin will be the banquet drawn from me.
Look round—the pale-eyed sisters in my cell,
Thy old acquaintance, Song and Famine, dwell.

* * * * * * * * *

—*Bryant.*

MOSQUITOES

By HERBERT OSBORN, Professor of Zoology

THERE is perhaps no insect which is better known or which attracts more frequent attention than this sleep-disturbing pestiferous little creature and still there are probably many people who know very little about its method of living or mode of growth. It is generally known in the form in which it makes its annoying attacks on our person or sometimes as it is seen gorged with blood upon cattle or horses.

Until a few years ago mosquitoes were looked upon as simply a very annoying pest and while their annoyance was by no means overlooked, it was quite generally taken as a matter of course and but little effort made to reduce their numbers or to guard against the annoyance except by the use of screens. Since it has been learned that in addition to this annoyance mosquitoes serve as carriers for some of the most dangerous

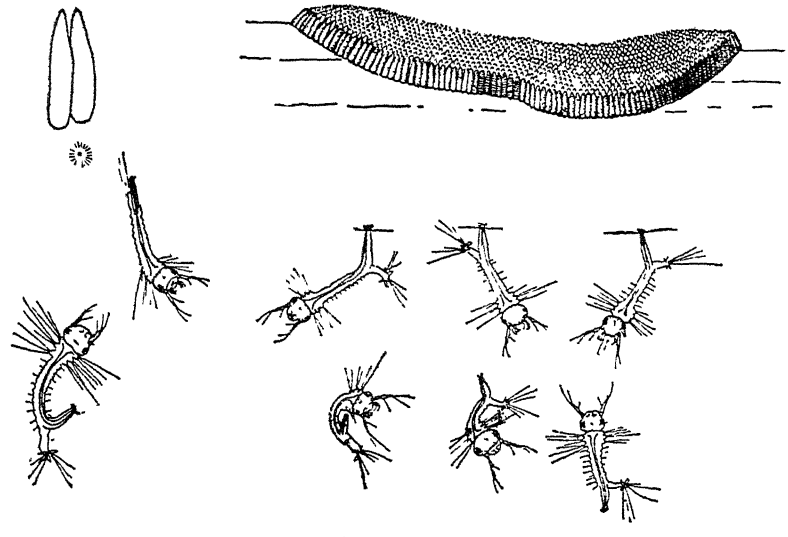


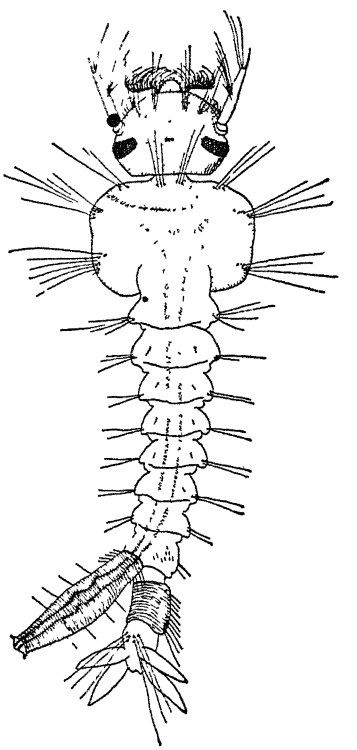
Fig. 1. Eggs and young "wigglers" of mosquito. Culex pipiens, (after Howard, Bull. Div. Ent. U. S. Dept. Agr.)

diseases known to man, this attitude has very greatly changed and now there is a great deal of attention being given to the study of the different kinds of mosquitoes, their habits, occurrence in different places, and especially the methods by which their numbers may be reduced.

While the adult form as it attacks us in our homes is the form most frequently noted, it is an easy matter to determine something more regarding the life of the insect, and a very interesting study may be made of the different stages of a mosquito with use of but little time and effort.

To make such a study it is necessary, only, to have access to some stagnant pool where material for observation may be secured. Two

ways, however, may be adopted for getting material at different stages. One, is to collect from a convenient stagnant pool or possibly from some old tin can or broken bottle a small quantity of water which is already occupied by the young mosquitoes or "wigglers." Such material may be kept in a fruit jar or tumbler, covered with mosquito netting, providing a little ooze or mud from the margin of a pool is added to furnish food for the wigglers. Another method is to place a fruit jar or old tin can partly filled with water in a place where mosquitoes are common, and within a day or two it will be pretty certain to contain eggs in sufficient number to thoroughly stock the water. This, as before, should be furnished with ooze or debris from a stagnant pool, so that some supply of food will be present for the wigglers to feed upon. The eggs, in the form of little boat shaped masses, float on the surface of the water and as they hatch pass into the water, where they begin feeding upon such minute aquatic organisms as may be present. Some pains may be necessary to see that the water does not include other animals of more voracious habit, which might devour the young mosquitoes and thus interfere with the study.



Full grown larva, culex pipiens, (after Howard.)

The habits of the wigglers in feeding and especially their frequent and jerky movements up to the surafce of the water in order to secure their needed supply of air may be watched at leisure and such movements will be found of great interest. In coming to the surface the wigglers, or larvae (to use the scientific term), ascend by a series of jerks and when at the surface reverse their position so as to bring the little air tube which is at the hind end of the body to the surface, this is then pushed through the surface film, opened to the air and exposed for a few seconds for the exchange of the air within the respiratory tubes for the fresh air from without, then the aperture is closed and the wigglers descend by a gradual, slow sinking movement to points where they may feed. After a few days in this form the shape of the body changes and they enter what is called the pupa stage. That is the form which corresponds with the chrysalis of the butterfly but which is not entirely inactive. In this stage they do not feed but they still move about, mostly at the surface of the water, and the respiratory tubes, which are now located near the head end of the body, are projected above the surface of the water to permit of respiration.

It will be interesting to compare the movements of larvae and pupae which may be present in the same dish. Only a short period is spent in the pupa stage and then it changes to the adult mosquito. This change is a very interesting one, in fact, a very critical period for the mosquito, as a very slight misadventure in its emergence from the water may cost it its life. The pupa rises to the surface with the back slightly above the water line and along this exposed surface there is a split in the pupa case and from this the mosquito gradually pushes its way out; first, the upper part of the thorax, then the portions of the head and abdomen and following these the front pair of legs is withdrawn and spread out upon the water in such a way as to give a little more stability to the parts above water; then by degrees the other legs, the wings and abdomen are freed from the pupa case, the legs as they issue spread out and rest on the surface of the water while the wings rapidly expand and dry so that in a short time the insect is ready to fly. It is easy to see that any disturbance of the surface of the water will interfere with the issuing of the mosquito, and if it once capsizes it is hardly possible for it to recover its position and complete its development.

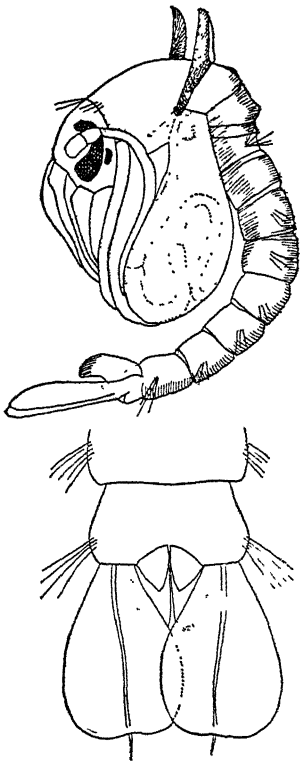


Fig. 3. Pupa of culex pipiens, (after Howard).

Of the adults that emerge there will be two quite distinct forms having a very striking difference in the antennae, which are little jointed appendages on the head. In the female these consist of a series of small joints with rather scanty short hairs, while in the male the hairs are very long and numerous, giving a plume-like appearance to the structure. It is claimed that these delicate hairy antennae of the male are its organ for hearing, and that by means of them it can determine the direction of a sound very accurately and it is assumed that by means of this sense it is able to determine the location of the sound of the song which is produced by the female. The females are the forms which make attacks upon warm blooded animals in order to suck their blood, the mouth parts of the male being much weaker. It has been thought that blood was perhaps necessary as a food for the females in order that they might develop eggs, but it seems hardly possible that this should be the case when we consider the immense numbers that must develop in places where no opportunity exists for obtaining blood from any warm blooded animal. The males and females, also, at times, are known to suck the juices of succulent plants, and it is probable that this material furnishes a considerable part of their food.

For the species which cause malaria and yellow fever there must be, however, a very well developed habit of feeding upon human blood

or else the continuity of the diseases would be interrupted. For the species which transmit disease it is necessary that blood be taken in from an individual suffering from the disease and that the period of rest follow, during which diseased organisms are developed through certain stages in the body of the mosquito, and then that in a different form this be carried from the mosquito's mouth parts into the circulation of another individual in which the organisms develop and produce the same form of disease. This means that for these mosquitoes, at least, there must be a period of some days between the issuing from the water and of egg deposition.

Eggs are deposited upon the surface of water and this may possibly be observed by careful watching, but since it occurs during the evening or night time it is not readily observed. After egg deposition the adult dies, but the period of development is so short that several generations may be produced in a single summer and these generations overlap each other in such a manner that adult mosquitoes will be present practically

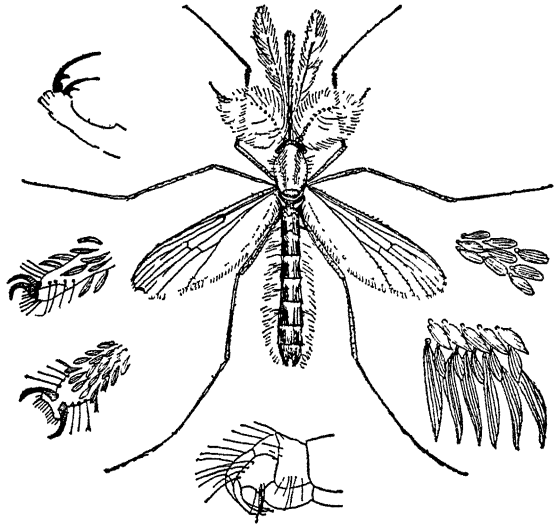


Fig. 4. Adult male, culex pipiens, (after Howard), Bull. Div. Ent.

every day of the season. It may be noticed, however, that in periods of dry weather, when the water in which mosquitoes may develop has evaporated, there may be at certain points an entire absence of mosquitoes. This indicates, too, that by some care to dispose of all little pools of water or such breeding places as old tin cans, broken crockery, exposed rain barrels, depressions in gutters or eaves. the abundance of mosquitoes might be greatly lessened or their presence entirely disposed of. It is easy to see, also, that since eggs are laid on the water and also since the wigglers must come to the surface for air, that a film of any oily substance on the surface of water will serve to kill them. A quite general practice is to spray a little keroesne on bodies of water which cannot be disposed of, as a means of preventing the growth of mosquitoes. This, however, can be used only where it is not important to

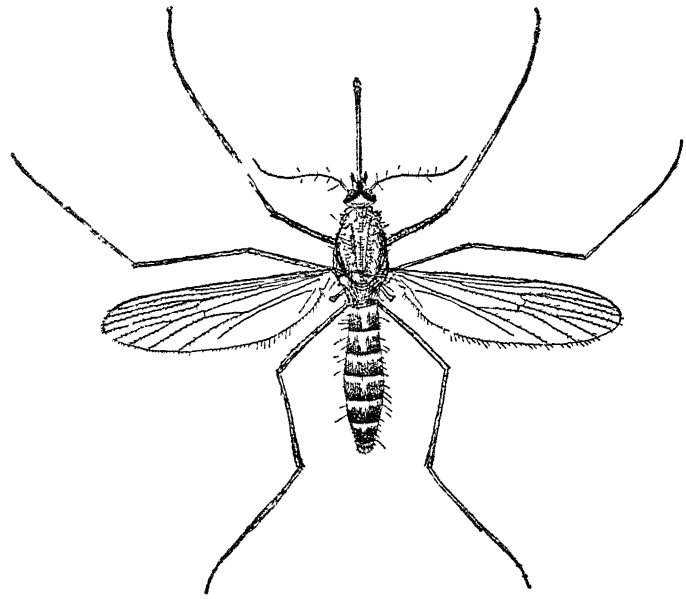


Fig 5. Adult female, culex pipiens, (after Howard), Bull. Div. Ent.

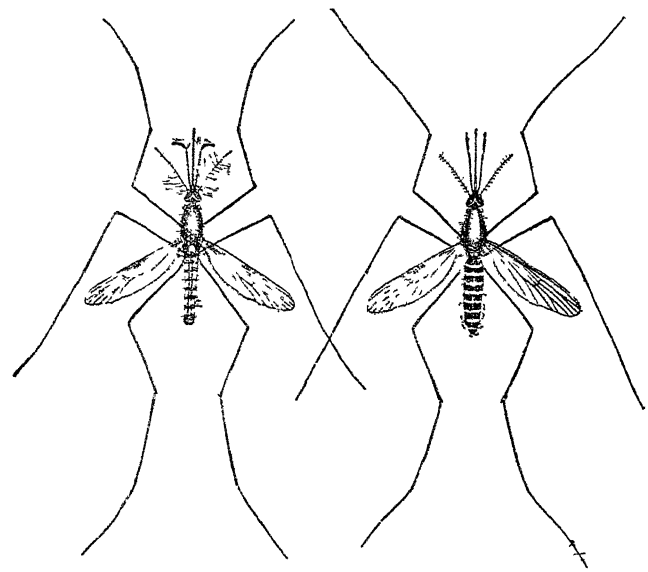


Fig. 6. Malarial mosquito. Anopheles maculipennis, (after Howard.)

preserve other forms of aquatic life and in general it is better to either entirely dispose of the pool by filling or drainage or to keep it so stocked with small fishes or other mosquito feeding animals, that the mosquitoes cannot thrive.

A point in the mosquitoes' habits which is of great importance in the matter of protection of any given house, is that they do not fly to great distances. For the ordinary house mosquito and for the malarial mosquitoes as well, it is quite certain that they will not travel more than 200 or 300 yards and that, consequently, attention to the breeding places in the immediate vicinity of any house will serve very largely as a protection. This means that for most farm houses practical immunity might be secured by careful attention to the surroundings of the house and the grounds for a few acres in extent. Probably in farm houses the most common source of supply is found in the rain barrels, water tanks and articles like old pails, broken crockery, tin cans, and such waste as may hold a small quantity of water for a period of a week or ten days.

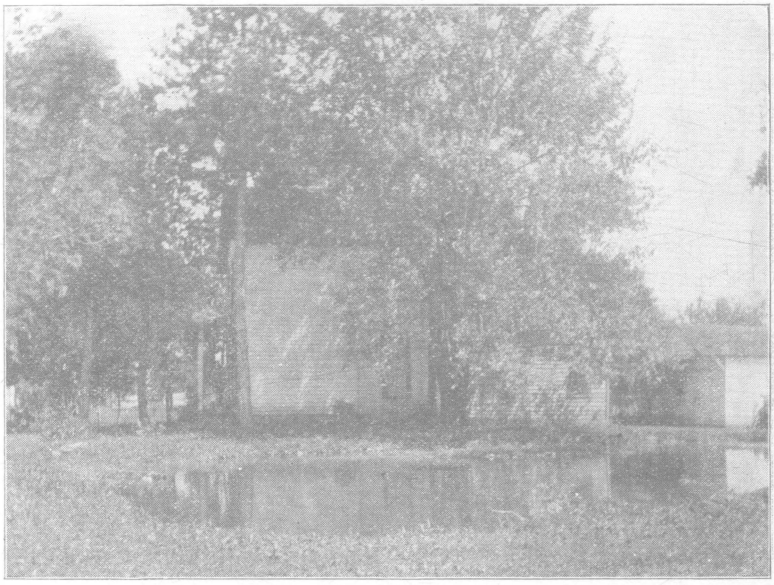


Fig. 7. A mosquito breeder that could be easily disposed of.

Now, while we have but very briefly noted some of the facts in connection with this little insect, I think it will be seen that it furnishes a most fascinating object for study, that it teaches us many things about the growth and relations of animal life both in water and in air and also much as to the possibllities of injury from such animals and some of the ways by which such an injury may be avoided. It may be noted that since mosquitoes have been more carefully studied a great number of different species have been detected. So far seventeen different kinds have been recognized as occurring in Ohio, but there must be many other kinds which will be found here when more collecting has been done.

The most common ones about houses are those known as the rain barrel mosquito and the malarial mosquito, both of which have a severe and annoying bite. It may be added, also, that the malarial mosquito will not infect a person with this disease unless it has first had opportunity to suck the blood from a person suffering with malaria, so no infection will occur if there are no persons sick with malaria in the vicinity or if persons having malaria are careful to remain in screened rooms during the night time so that mosquitoes cannot get access to them.

Review of the Leading Articles

Selection of Seed Corn—By C. G. WILLIAMS.....September
What are the desirable characteristics of the corn plant?
How can we secure corn that will ripen well in our climate?
What points indicate a vigorous corn plant?
What is meant by "ear row" test?
Why select an ear from a hill of two or three stalks rather than from a single stalk in a hill?
When is the best time to select seed corn?
Why should position of ear on a stalk be considered?
What are the most desirable kernels or grains as to shape?

Grasshoppers and Crickets—By Professor HERBERT OSBORN..October
When do grasshoppers lay their eggs? Where?
When do the eggs hatch?
About how many times is the skin thrown off before they reach adult size?
Do they confine their eating to grasses alone?
How does the cricket make its peculiar call?
What is pecuilar about the mole-cricket? Upon what does it feed?

A Word About Trees—By Professor W. A. KELLERMAN.....November
What is the general shape of each of the following: Elm, oak, lombardy poplar, spruce?
What steps should be taken to draw a tree?
Try to name trees which are some distance from you.

A Study of Winter Birds—By Professor J. S. HINE.....December
What birds remain with us through the winter?
What do they feed upon?
Where is each one usually found?
In what way is each bird enabled to secure its food?

The Formation of the Soil—By Professor ALFRED VIVIAN.....January
From what substances has the soil been formed?
How has nature broken the rocks into very fine particles?
How does nature mix vegetable forms with rock particles?
What part has water to perform?
Of what use are nitrogen and carbonic acid gas?
What are sedentary and transported soils?

Improvement of the Corn Crop—By Professor J. A. FOORD.....March

What are the principal points considered in a score card for corn?
Discuss the following points: Maturity, germ, color, tips, and per cent of grain.
How is a germination test made?

Germination of Garden and Field Seeds—By Professor V. H. DAVIS, April

What is an embryo plant?
In what way does the corn grain differ from the bean?
Where is the food supply for the embryo stored?
What conditions are necessary that seeds may sprout and grow?
How deep should seeds be planted?
Why not plant lettuce or petunias as deep as corn or beans?
How may garden seeds be tested?

A Little Lesson in Judging Cattle—By Professor C. S. PLUMB.....May

What are the two most common types of cattle?
What are the principal points that distinguish beef from dairy cattle?
What is meant by "quality" as applied to animals?
About what is the difference in price between cattle used for canning and choice or good beef cattle?

Mosquitoes—By Professor HERBERT OSBORN.....June

Where do mosquitoes lay eggs?
What changes take place before they can fly?
How may the number be diminished?
How may malaria be spread by mosquitoes?

High school boys testing milk for butter fat, Washinton Tp. (Franklin Co.,) O.
Outfit can be purchased for $9.00.

A Few Words From Our Little Correspondents

(Space cannot be given to reproduce entire letters but some of the most important parts will be given place in the BULLETIN.

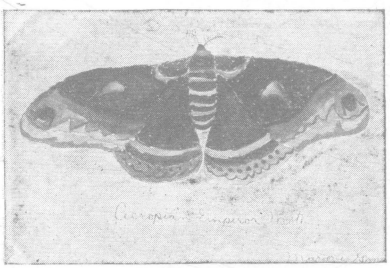
A little space will be used for pictures of animals which boys or girls own, children's flower or vegetable gardens, and other things which show what there is on the farm in which one can be interested.

Parts of letters that are not of general interest will not be printed.

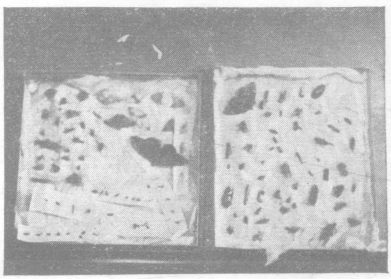
As I go from place to place in our state, it may be my pleasure to see at your school or home what you are writing about. *A. B. Graham.*)

A south-eastern Ohio boy says that their school house stands in a very small yard where there is a large elm about dead, a few maples, and a small pond that covers a part of it nearly the entire term. There are no pictures. A few boards, once painted black, are still used as a blackboard.

No books but the regular text-book. Charts and a manikin never used. A little school of ten pupils in a wealthy community.



Painted by Marjorie Good.



Collection of harmful and helpful insects.

An excellent description of a bird was sent to this department several weeks ago by a northern Ohio boy. He was careful to give its size by comparing it with a common bird that he knew; its length, color of feathers in different parts of the body; shape of bill, and description of its feet. He was informed that the bird was a sparrow-hawk.

* * * * * * * * * * *

Do not pleasing surroundings help pupils and teacher to do better work? As a rule, we grow into harmony with our surroundings. The value of the character of boys and girls cannot be measured by the yard, gallon, pound, or dollar, or as the value of a cow, horse, hog, sheep, etc., are determined.

Schools should do more for genuine pleasure in life than to offer so much routine text-book work.

The teacher's influence is felt on the play ground and in the school yard and roadside walk with the children; it helps in putting both teacher and pupils in harmony with the best things.

* * * * * * * * * * *

It is our desire to assist boys and girls, as well as teachers, to get acquainted with common things near them.

Summer School

Courses in Elementary Agriculture and Manual Training will again be given in the Summer Term at the Ohio State University, beginning June 24. Address the Secretary of the University Faculty, O. S. U., Columbus, Ohio, for Summer Term Announcement.

Notice

This is a *free* bulletin, and each one who now receives it and wishes to have his name placed on the mailing list for *next year* should write at once or as soon as he has determined his post office address. In changing address, give both old and new address.

Members of Agriculture Clubs and pupils now receiving this BULLETIN will have their names continued without action on their part.

No Bulletins are issued in July and August.

WHAT ARE THEY? This department will always be ready to assist you in naming plants and insects. Send specimens by mail, carefully packed. Do not hesitate to ask the name for the most common thing. Get acquainted with what lives near you.

A. B. GRAHAM,
Superintendent of Agricultural Extension.

A lesson in rope splicing in a rural school.

ROBERT OF LINCOLN.

WILLIAM CULLEN BRYANT. HENRY HARRISON JOHNSON.